1_SERVICE-LEARNING FOR RECOVERY AND CIVIC ENGAGEMENT

1_Short Papers

PROVISION OF PARTICIPATORY LAND MANAGEMENT IN TERRITORIAL COMMUNITIES: AN ANALYTICAL FRAMEWORK FOR COLLABORATIVE GOVERNANCE AND SERVICE-LEARNING

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The management of land resources in the era of decentralization requires a fundamental shift from technocratic, top-down administration to inclusive, participatory frameworks that reconcile economic growth with social equity and environmental sustainability. This article substantiates the principles of decision-making as a core component of participatory land management (PLM) within territorial communities, with a specific focus on Ukrainian legislative context. Utilizing a transdisciplinary methodology that integrates systemic, logical-structural, and informational analysis, the research includes a three-stage model for effective land-use planning: goal determination, analysis of sustainable development factors, and the evaluation of expediency and efficiency. The paper examines the integration of these paradigms into the educational process through the "Learning Lab" model and service-learning frameworks, specifically applying Tronto's "ethic of care" cycle to enhance students' social capital and professional competencies in post-conflict restoration. The study concludes that institutionalizing participation and bridging the information gap between communities and authorities are essential for fostering territorial resilience and sustainable recovery.

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1. Introduction and Review of Current Research

The management of land resources within territorial communities has undergone a transformative paradigm shift, transitioning from rigid, centralized state administration toward decentralized, participatory frameworks. This evolution is a response to the increasing complexity of socio-ecological systems and the historical failure of top-down, "place-blind" sectoral policies to address local developmental needs effectively [3]. Participatory land management (PLM) is conceptualized as an inclusive, transdisciplinary decision-making process where citizens, local authorities, and diverse stakeholders collaborate to manage land resources, ensuring legitimacy, social equity, and environmental sustainability [11].

1.1 The landscape of Ukrainian decentralization and land reform

In Ukraine, the reform of local self-government has been systemic and permanent since 2014, grounded in the principle of subsidiarity – ensuring that decisions are made at the administrative level closest to the citizenry. Between 2015 and 2020, Ukraine consolidated 10,961 local units into 1,469 amalgamated territorial communities (hromadas), which were granted significant financial and managerial autonomy. A critical milestone was the "ubiquity of jurisdiction," established by Law No. 1423-IX, which transferred the power to dispose of land parcels outside settlement boundaries from the State Service for Geodesy, Cartography and Cadastre to community property.

This administrative modernization provided the spatial basis for economic development, yet it created an urgent need for transparent, participatory management algorithms to navigate the changed conditions of modern times. The current context of martial law has further emphasized the role of hromadas as resilient actors capable of coordinating humanitarian aid and maintaining local governance stability despite infrastructure losses totaling approximately $155 billion by the end of 2024.

1.2 Theoretical Foundations and Global Paradigms

Contemporary academic discourse emphasizes the integration of traditional knowledge with empirical scientific modeling to

bridge the “epistemological mismatch” between local systems and Western planning paradigms [10]. Key theoretical frameworks influencing PLM include:

– participatory and negotiated territorial development – a methodology promoting social dialogue and negotiation to improve trust among social actors and promote systemic territorial development;

– multi-level governance – a theory distinguishing between Type 1 governance (administrative tiers) and Type 2 governance (flexible collaboration between state and non-state actors for specific tasks).

– onstrumental and relational value theory – a “lens” through which land-use decisions are viewed not just as profit-maximization (instrumental) but as a reflection of human relationships with the landscape and society (relational) [10].

Research by Malek and Verburg (2020) mapping global land-use decision-making identifies six distinct types of decision-makers: survivalist, subsistence-oriented smallholder, market-oriented smallholder, professional commercialist, professional intensifier, and eco-agriculturalist [9]. Decisions are heavily influenced by socio-economic, climatic, and soil conditions, with “survivalist” objectives predominating in areas with high poverty.

Furthermore, the DESIRE project demonstrated that combining local traditional knowledge with empirical evaluations of sustainable land management (SLM) technologies facilitates broad-scale adoption [15]. By presenting scientific evidence within a local context, researchers can trigger shifts in stakeholder perceptions, leading to more sustainable land-use trajectories.

2. Methods

The methodology for substantiating decision-making principles in PLM utilizes a transdisciplinary framework integrating systemic, informational, and logical-structural analysis [1].

The method of systemic and logical-structural analysis defines the functional components of the participatory management system. It identifies “mode-forming objects” – industrial or agricultural facilities that dictate the functional purpose and restrictions of

surrounding territories [12]. This involves mapping “hot spots” of degradation and “bright spots” of sustainable management.

Participatory rural appraisal and mapping tools engage stakeholders throughout the research phases. These include:

– social mapping and brainstorming to identify community values and land-use patterns;

– fuzzy cognitive maps used in workshops to represent relationships between socio-economic drivers and environmental impacts;

– participatory process to agree on and establish boundaries between distinct ownership or use areas.

GIS-based land suitability and accessibility analysis in regions with official data shortages, researchers employ GIS to assess land suitability. A critical component is the “access time criterion,” which calculates the ease with which land can be reached for exploitation, allowing for more realistic assessments than purely biophysical models [4].

Econometric and efficiency modeling to quantify the performance of industrial land use, the research applies mathematical modeling. Efficiency is defined as the ratio between production volume and the total spatial footprint, including the area of restrictions. Productivity is measured using tools like the Malmquist Productivity Index and Data Envelopment Analysis [13].

Participatory monitoring and evaluation framework involves a horizontal approach consisting of seven phases: (1) selection of the working group, (2) definition of objectives, (3) establishment of the baseline, (4) selection of indicators, (5) data collection, (6) analysis, and (7) social learning. This bridges the gap between scientific and local communities by integrating Technical Indicators of Soil Quality with Local Indicators of Soil Quality.

3. Results

Effective participatory land management in territorial communities necessitates a structured three-stage decision-making model:

– Stage 1 – determination of land-use purposes;

– Stage 2 – analysis and assessment of sustainable development factors;

– Stage 3 – deciding on expediency and efficiency.

The stage 1 is decisive for planning industrial and territorial development. It requires a comprehensive analysis of existing and potential enterprises:

– utilizing statistical information and geospatial data to identify existing industrial assets;

– engaging investors, environmental specialists, and residents to define the community's industrial trajectory;

– determining environmental carrying capacity and aligning industrial activity with urban planning documentation [12].

An inclusive four-step model for decision-making includes: (1) community reflection on investor requests, (2) documentation of a historical timeline to foster land-belonging, (3) inclusive dialogue with companies, and (4) an inclusive voting process using a "direct tracking matrix".

During the stage 2 the effective factor analysis must consider:

– factors like agricultural intensification and water quality often have synergistic or trade-off relationships [2];

– quantitative and qualitative indicators of factor impact must be periodically reviewed to account for technological innovation;

– the adoption of sustainable practices is influenced by education levels and socio-demographic factors.

The stage 3 decisions on land use must be acceptable to stakeholders, consistent with regional development plans, and transparent. Research substantiates that efficiency in industrial land management is expressed through a mathematical relationship.

The Efficiency Factor is formulated as: where is the volume of products produced, is the area of the land parcel, and is the area of restrictions (e.g., sanitary protection zones) impacting surrounding land.

Land use is most efficient when production volume per unit of area is high and negative spatial impact on third-party parcels is minimized. Key factors for increasing efficiency include:

1. Strategic placement near transport nodes and resource clusters to minimize infrastructure costs.

2. Use of resource-saving and low-emission production cycles to reduce the radius of sanitary protection zones.
3. Rational placement of structures and use of non-agricultural land reserves to free land for social infrastructure.

4. Discussions

Participation exists on a gradient from coercive (check and balance) to interactive (shared responsibility/co-management). While R&D projects utilize participatory methods, they often face tensions between short-term project goals and the institutional stability required for long-term territorial continuity [14]. Effective PLM requires "bridging the information gap" between communities and state institutions to empower local leaders.

A recurring challenge in industrial land management is the regulation of sanitary protection zones around "mode-forming objects". Research identifies two planning models: those with and without an overlap [12]. Systemic modeling can identify and eliminate overlaps, reclaiming land for social infrastructure. Precise determination of centroids for these objects is critical for accurate registration in the state land cadastre.

In Ukraine, the 2024 legislative updates institutionalize the role of citizens in reconstruction planning. The postponement of mandatory spatial development plans until 2028 acknowledges wartime constraints while prioritizing communities with established plans for international financial aid. Decentralization has provided hromadas the organizational capacity for infrastructure projects (water supply, shelters), reflecting 41,33 % of initiated community ideas.

The transition toward participatory land management requires a fundamental shift in how future land managers, urban planners, and public administrators are trained. Higher education institutions in Ukraine and beyond are increasingly adopting innovative pedagogical frameworks to bridge the gap between technical diagnostics and community-led decision-making [8].

Modern land management education is moving toward the "Learning lab" model, particularly in response to the 2024 European nature restoration law. These labs function as trans-disciplinary spaces where students, municipal officers, NGOs, and residents co-produce evidence.

Now students are trained to be “technically fluent” (remote sensing, GIS, modeling) and “socially literate” (participatory facilitation, ethical reflexivity, policy communication). In post-conflict areas pedagogy includes memory walks and oral histories to ensure that restoration proposals are “community-legitimate” and recognize local historical contexts. Students are able to produce evidence packages, data-stewardship templates, and containerized software stacks that municipalities can directly adopt for nature restoration law reporting.

SL is a core tenet of educational reform, explicitly connecting academic learning with community service [7]. Applying an “ethic of care” lens (Tronto’s cycle) helps students move beyond a “serving others” charity perspective toward a critical approach that dismantles structures of injustice. Tronto’s cycle includes: (1) caring about (attentiveness), (2) caring for (responsibility), (3) care-giving (competence), and (4) care-receiving (responsiveness).

Participatory planning projects show a positive and statistically significant correlation with the development of students’ social capital and social awareness. Practicing these skills increases students’ sense of responsibility to society, resulting in “socially conscientious” professionals whose projects better address the needs of diverse populations.

The scale of decentralization in Ukraine has prompted the launch of targeted lifelong learning programs for civil servants and community land managers. The “New opportunities for communities in land management” (2021-2022) program offered distance learning for community leaders, focusing on the latest legal requirements and GIS applications for decision-making. Updated pedagogical designs integrate student awareness, experiential learning, and mental resilience, strengthening public administration affected by the crisis.

The convergence of participatory projects and SL represents a powerful pedagogical synthesis that transforms both the educational environment and community resilience. In this framework, participatory projects serve as the “real-world laboratory”, while service learning provides the “reflexive and ethical scaffolding” necessary for sustainable outcomes.

6. Conclusions

The substantiation of decision-making principles within participatory land management provides a roadmap for the sustainable development of territorial communities. The research demonstrates that the greatest potential for increasing land-use efficiency lies in the transition from technocratic state administration to collaborative co-management structures. The three-stage decision-making model – integrating goal determination, sustainable factor analysis, and mathematical efficiency evaluation – offers local authorities a transparent algorithm for managing industrial resources while minimizing negative environmental externalities.

A critical finding of this study is that efficiency in industrial land use must be viewed through a synthetic lens of economic output and spatial footprint optimization. By utilizing innovative technologies and rational building placement, communities can reclaim "dead zones" from overlapping sanitary protection zones, thereby freeing land for social infrastructure and ecological restoration.

Furthermore, the integration of these paradigms into the educational sector through "Learning Labs" and service-learning initiatives is essential for cultivating a new generation of "socially conscientious" professionals. Applying an "ethic of care" to the educational process ensures that land management practices in post-conflict settings like Ukraine are community-legitimate and trauma-informed. Ultimately, bridging the information gap through e-democracy tools and permanent participatory structures will strengthen the social capital of territorial communities, ensuring their long-term resilience and compliance with global sustainability objectives.

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